

REMARKS

Applicants have amended claims 4, 5, 11-14, and 16 and added new claims 29-38 to more particularly point out and distinctly claim the subject matter which they regard as their invention. Support for the amendments can be found in the specification.¹ No new matter has been introduced by the amendments. Claims 1-3, 6-9, 17, 19, 23, and 25 have been canceled.

Upon entry of the above amendments, claims 4, 5, 10-16, 18, 20-22, 24, and 26-38 will be pending and under examination. Reconsideration of this application, as amended, is respectfully requested in view of the remarks below.

Applicants would like to first point out an error in the Office Action. The Examiner indicated that claims 1-16 were pending in this application. See the Office Action, page 1, the "Disposition of Claims" section. Of note, claims 17-28 were added in the response dated November 23, 2005 to an office action. Therefore, claims 1-28, not claims 1-16, were pending.

The Examiner rejected claims 1-16 as obvious over WO 93/06191, or further in view of EP 0990673. See the Office Action, page 2, lines 10-11. For a complete record, Applicants will address below the patentability of claims 1-28, instead of claims 1-16, over the cited references. Claims 1-3, 6-9, 17, 19, 23, and 25 have been canceled. Claims 4, 10, 12, and 14, the independent claims, will be discussed first.

Claims 4 and 14 both cover a method of producing a film by (1) preparing a liquid containing 2-30% by weight a polybenzazole precursor; (2) spreading the liquid in the form of a film; (3) applying a magnetic or electric field to the spread liquid to orient the polybenzazole precursor along one direction; and (4) solidifying the spread liquid. The polybenzazole precursor of claim 4 is limited to that having a unique chemical structure. See the formulas recited in this claim.

Claim 10 covers the same method as claim 4, except for including an additional step, i.e., chemically converting the polybenzazole precursor into polybenzazole after the applying step.

¹ Claims 4, 10, 12, and 14, as amended, each recite "the concentration of the polybenzazole precursor in the liquid being 2-30% by weight." Support for the recitation can be found in the specification, page 12, lines 4-6. Claims 5, 11, 13, and 16 are amended to merely delete an alternative recited therein. Support for new claims 29 and 30, new claims 31-34, new claims 35-38 can be respectively found at page 17, lines 31 and 32; page 7, lines 8-15; and page 13, lines 13-14 of the specification.

Claim 12 covers the same method as claim 4, except for including an additional step, i.e., chemically converting the polybenzazole precursor into polybenzazole after the solidifying step. Like claim 4 and 14, claims 10 and 12 require use of a liquid containing 2-30% by weight a polybenzazole precursor.

In sum, claims 4, 10, 12, and 14 all require that the concentration of the polybenzazole precursor be 2-30% by weight.

WO 93/06191 teaches a film containing a liquid crystalline polymer (LCP), which has an in-plane biaxial skewed orientation. The LCP-containing film is prepared by sequentially (1) treating a thermotropic LCP melt or a dope containing lyotropic LCP with simultaneous biaxial shearing forces to produce a film having a controlled in-plane biaxial orientation; (2) treating the film with cross-directional strains; and (3) subjecting the film to a magnetic or electric field. See page 11, lines 15-28. Of note, the dope refers to a solution including a liquid crystalline polymer and polyphosphoric acids. See page 3, lines 3-6.

While WO 93/06191 describes applying a magnetic or electric field to a liquid containing a polymer (i.e., LCP), it fails to specify the concentration of the polymer. By contrast, claims 4, 10, 12, and 14 require a specific range of the concentrations of the recited polybenzazole precursor, i.e., 2-30% by weight. In this connection, Applicants would like to bring to the Examiner's attention the following statements set forth in MPEP 2131.03:

If the claims are directed to a narrow range, the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range, it may be reasonable to conclude that the narrow range is not disclosed with "sufficient specificity" to constitute an anticipation of the claims. **The unexpected results may also render the claims unobvious.** (emphases added)

As pointed out in the present specification, the methods of claims 4, 10, 12, and 14 lead to unexpected results. See page 12, lines 4-16. That is, the claimed methods, which require that the concentration of a polybenzazole precursor be 2-30% by weight, are advantageous over the method in which the polybenzazole precursor's concentration is lower than 2% or higher than 30%. More specifically, when polybenzazole has a concentration lower than 2%, it does not

form a liquid crystal or spherulite; and when it has a concentration higher than 30%, it is difficult to be oriented under a magnetic field. Pursuant to the law restated in the above quotation from the MPEP, Applicants submit that this "unexpected results [] render the claims unobvious" over WO 93/06191.

Applicants also submit that the unexpected results also render claims 4, 10, 12, and 14 unobvious over a combination of WO 93/06191 and EP 0990673. EP 0990673 discloses polybenzazole resins and their polybenzazole precursors. Like WO 93/06191, it does not disclose or even suggest the concentration of a polymer in any solution. Thus, this reference, in combination with WO 93/06191, does not render claims 4, 10, 12, and 14, given the unexpected results associated with the specific concentration range recited therein.

For the reasons set forth above, claims 5, 11, 13, 15, 16, 18, 20-22, 24, and 26-28, all of which depend from claim 4, 10, 12, or 14, are also not rendered obvious by WO 93/06191 and EP 0990673, either alone or in combination.

Applicants would also like to point out that claims 10 and 12 and the claims dependent therefrom are also patentable over the cited prior art references on an additional and independent ground.

As mentioned above, claim 10 recites the limitation of chemically converting a polybenzazole precursor into polybenzazole after treating the precursor with a magnetic or electric field; and claim 12 recites the limitation of chemically converting a polybenzazole precursor into polybenzazole after solidifying a liquid containing the precursor.

As discussed above, WO 93/06191 teaches a method of preparing a film including a step of treating a dope containing a polymer with a magnetic or electric field and a step of solidifying the dope. However, it does not teach or suggest chemically converting a polybenzazole precursor into polybenzazole after the treating or solidifying step. EP 0990673 discloses novel polybenzazole resins. It does not mention applying a magnetic or electric field or solidifying a liquid containing polybenzazole. It follows that this reference does not teach or suggest chemically converting a polybenzazole precursor into polybenzazole after treating the precursor with a magnetic or electric field or solidifying a liquid containing the precursor.

In sum, neither WO 93/06191 nor EP 0990673 teaches or suggests the unique converting step required in claims 10 and 12. Thus, these two references, either alone or in combination, do not render obvious claims 10 and 12. Neither do they render obvious claims 11, 13, 20, 21, 26, 27, 29, 30, 32, 33, 36, and 37, which depend from claim 10 or 12.

Further, claims 24 and 26-28 are also distinguishable from the cited prior art references on an additional and independent ground.

Claims 24 and 26-28 each require "the polybenzazole precursor is uniaxially oriented by the application of the magnetic or electric field" (emphasis added). By contrast, WO 93/06191 teaches preparing a polymer film in which a biaxially oriented polymer is skewed out of the orientation plane after being subjected to a magnetic or electric field. See page 11, lines 9-28. In other words, the polymer is not uniaxially oriented by application of a magnetic or electric field film. Indeed, nowhere in this reference is it taught or suggested that a polymer is uniaxially orienting polymer by a magnetic or electric field. Thus, WO 93/06191 does not render obvious claims 24 and 26-28, which require uniaxially orienting the polybenzazole precursor by a magnetic or electric field. EP0090673, the secondary reference, is silent on uniaxially orienting the polybenzazole precursor by a magnetic or electric field. Claims 24 and 26-28 are therefore not rendered obvious by WO 93/06191 and EP 0990673, either alone or in combination.

Finally, Applicants would like to address the patentability of new claims 29-38. These new claims depend from claim 4, 10, 12, or 14. For the reasons set forth above, they are also not rendered obvious by WO 93/06191 and EP 0990673, either alone or in combination.

CONCLUSION

Applicants respectfully submit that the grounds for rejection asserted by the Examiner have been overcome, and that claims 4, 5, 10-16, 18, 20-22, 24, and 26-38, as pending, define patentable subject matter. Applicants therefore request that the Examiner allow the pending claims.

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Enclosed is a \$120 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050, referencing Attorney's Docket No 14157-011001.

Respectfully submitted,

Date: _____

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